

Permit 2016-001:

Name:

Dervla Kumar

Department or Organization:

University of Pittsburgh

Email Address:

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Web Address where the public can learn more about this proposed activity (optional):

<http://pitt.edu/~jwerne/>

Are you requesting renewal of a previously approved permit applicaton?

No

Type of activities at The University of Akron Field Station and Bath Nature Preserve
Research

Title of project or class name and course number:

Tracing the Origins of Branched GDGTs: Towards the Development of GDGT-based
Paleothermometers

Date/Dates requested:

03/2016 - 06/2016

Number of people in group:

2

I am requesting permission to use a Research Area.

No

I am requesting permission to use a Sensitive Area.

Yes

I am requesting permission to use areas outside of the designated Research or Sensitive Areas.

No

I would like to use the Martin Center for Field Studies and Environmental Education for this
prop...

Yes

Will the activity involve destructive sampling/collecting?

No

Which Sensitive Areas?

Bath Pond

Please indicate any preparation or set-up you will need in the Martin Center for Field Studies an...

I would need lab space in the martin center to filter water samples taken from Bath Pond. Filtration would be done with portable pressure filtration system equipment that my lab group owns.

Provide a brief description of (1) your proposed activities, (2) goals, and (3) impacts of your u...

1. I propose to analyze soil, lake water, and lake sediment samples collected from Bath Pond and its surrounding soils for the presence of environmentally relevant bacterial membrane lipids called brGDGTs. Samples will be collected monthly to see how the abundances and distributions of brGDGTs changes on an annual cycle and how that may be related to seasonal changes in climate or microbial ecology.

2. The goals of this study are to investigate the timing and location of brGDGT production in a temperate watershed. Several paleoclimate proxies have been proposed based on brGDGT lipids, however there is still much work to be done in order to refine the relationship between brGDGT production and environmental parameters that influence their production such as temperature or soil pH. BrGDGTs are ubiquitous in terrestrial environments yet they have not been conclusively connected to a specific source organism. Empirical evidence suggests that bacteria produce these lipids in response to changing temperature and soil conditions, but because the source bacteria has yet to be isolated in culture the exact relationship between brGDGT production and environmental conditions is unknown. We plan to use a combination of genetic and lipid analyses to link brGDGT abundances to active microbial communities and isolate the bacterial source of brGDGTs.

3. Some of the highest concentrations of brGDGT lipids ever reported have been from Bath Nature Preserve soils (see Weijers et al., 2011 doi:10.1016/j.gca.2011.03.015), making this site ideal for investigation of the lipids' source organism. The results of this work will be crucial for drawing connections between brGDGT production and the environment and will aid in the development of brGDGT-based paleoclimate proxies. Perhaps the most significant proxy based on brGDGTs is a paleotemperature proxy. Reconstructing how temperature has changed on land through Earth's history has been notoriously difficult, but brGDGT based paleothermometers would equip paleoclimatologists with a tool to do so. By looking at how temperature has changed through time, we can see how warming affected other parts of the climate system (e.g. increased storm activity, exacerbated drought, shifts in vegetation) so that we will can anticipate the kind of effects anthropogenic warming will have over the next century.

By checking this box, I agree to the above terms and state that all of the above information is c...

I agree